REMARKS/ARGUMENTS

Claims 1-28 are pending.

Applicants wish to thank the Examiner for indicating in the Advisory Action dated

July 21, 2008, that the amendments filed on July 14, 2008, in response to the Final Official

Action of April 17, 2008, have been entered. The Examiner has also indicted that the

rejection of claims 14-26 under 35 U.S.C. 102(b) or 103(a) over Moczygemba, US 5,393,838

(Moczygemba II) has been withdrawn in view of the amendments.

The rejection of claims 1-3 under 35 U.S.C. 103(a) over Moczygemba, US 5,705,569

(Moczygemba I) is traversed because Moczygemba I does not teach:

(1) selecting a block copolymer mixture comprising block copolymers comprising 65

to 75 mass% of a vinyl aromatic hydrocarbon and from 25 to 35 mass% of a conjugated diene

as monomer units and satisfying the claimed molecular weight distribution, M1/M3 and

M2/M3 ratios, and the claimed peak top molecular weight, wherein all monomer units are

charged as pure monomers and each charge is completely polymerized before the addition of

the subsequent charge (see claim 1), and

(2) selecting the claimed block copolymer mixture comprising block copolymers

comprising 65 to 75 mass% of a vinyl aromatic hydrocarbon and from 25 to 35 mass% of a

conjugated diene as monomer units, wherein each polymer block S1, S,2, and S3 consisting

of the vinyl aromatic hydrocarbon as monomer units is directly attached to the conjugated

diene polymer block B; the polymer blocks S1, S2, and S3 do not contain the conjugated

diene polymer block B; and the conjugated diene polymer block B does not contain the

polymer blocks S1, S,2, and S3 (see claim 14);

(3) Moczygemba I teaches away from the claimed content of the conjugated diene;

and

(4) the claimed block copolymer mixture has unexpectedly advantageous properties compared to the Moczygemba I block copolymer.

Moczygemba I discloses a general process for obtaining a large number of block copolymers (col. 2, lines 8-27; and col. 8, lines 9-29) but specifically teaches copolymer blocks that are differ from those claimed (see embodiments 1-4 in Tables 1-23 and the Examples).

As known in the art, morphology and/or physical properties of block polymers are different depending upon, e.g., molecular weight of a hard segment/soft segment, composition ratio and/or compatibility.

The block copolymers of specific embodiment 3 (the only embodiment wherein the conjugated diene polymer block B is charged as a pure monomer) in Moczygemba I have a different structure and, therefore, different properties from that claimed polymer because the Moczygemba I copolymers are prepared by a different method (see Table 3). In embodiment 3, styrene is charged four times followed by charging butadiene (see Table 3), while in the claimed block copolymers obtained by charging styrene three times..

In the polymerization method disclosed as the third embodiment in Table 19 of Moczygemba I, the proportion of a conjugated diene contained in the copolymer is 15 mass%, while in the polymerization method disclosed in Examples 1 to 7 of the present application, such a proportion is from 25.3 to 31.2 mass%, and, therefore, there is a great difference between the copolymer of Moczygemba I and that claimed.

As shown in the following experimental data, the polymer obtainable in Moczygemba I is inferior in the impact resistance though superior in the transparency to the present invention. On the other hand, the claimed copolymer is superior in balance between transparency and impact resistance to that of Moczygemba I. See the Declaration under 37 CFR 132 of Mr. Jun Yoshida submitted with this paper.

Experimental Data

The experiments were conducted by the polymerization method disclosed as the third embodiment in Table 19 of Moczygemba I and the polymerization method disclosed in Example 1 of the present invention, respectively.

Experiment 1 (TABLE 19 in Moczygemba I)

(1) Into a reactor, 467 kg of a polymerization solvent was charged and maintained at 30°C.

(2) As a polymerization catalyst solution, 850 ml of an n-butyllithium 10 mass% cyclohexane solution was added thereto, followed by adding 80.0 kg of a styrene monomer to carry out anionic polymerization of a styrene monomer. Hereinafter, as all of polymerization catalyst solutions in an experimental data, an n-butyllithium 10 mass% cyclohexane solution was employed.

(3) After the styrene monomer was completely consumed, while the internal temperature of the reaction system was maintained at 50°C, 910 ml of a polymerization catalyst solution was added and further 40.0 kg of a styrene monomer was added thereto to carry out a reaction.

(4) After the styrene monomer was completely consumed, while the internal temperature of the reaction system was maintained at 50°C, 2670 ml of a polymerization catalyst solution was added and further 20.0 kg of a styrene monomer was added thereto to carry out a reaction.

(5) After the styrene monomer was completely consumed, while the internal temperature of the reaction system was maintained at 50°C, 30.0 kg of a styrene monomer was added thereto to carry out a reaction.

(6) After the styrene monomer was completely consumed, while the internal temperature of the reaction system was maintained at 50°C, 30.0 kg of butadiene was added thereto to carry out a reaction.

(7) After butadiene gas was completely consumed, while the internal temperature of the reaction system was maintained at 75°C, a solution obtained by dissolving 860 g of a coupling agent "ADEKASIZER O-130P™" (manufactured by ASAHI DENKA CO., LTD) made of epoxidized soybean oil in 5L of cyclohexane, was added thereto to carry out a coupling reaction for 10 minutes.

(8) All polymerization active terminals were deactivated by water.

(9) After a preliminary concentration of the polymerization solvent, an evaporation treatment was carried out by a vented extruder to obtain pellets.

Experiment 2 (Example 1 of the present invention)

(1) Into a reactor, 467 kg of a polymerization solvent was charged and maintained at 30°C.

(2) 710 ml of a polymerization catalyst solution was added thereto, followed by adding 69.0 kg of a styrene monomer to carry out anionic polymerization of a styrene monomer.

(3) After the styrene monomer was completely consumed, while the internal temperature of the reaction system was maintained at 50°C, 1700 ml of a polymerization catalyst solution was added and further 23.0 kg of a styrene monomer was added thereto to carry out a reaction.

(4) After the styrene monomer was completely consumed, while the internal temperature of the reaction system was maintained at 50°C, 3560 ml of a polymerization catalyst solution was added and further 52.0 kg of a styrene monomer was added thereto to carry out a reaction.

(5) After the styrene monomer was completely consumed, while the internal temperature of the reaction system was maintained at 50°C, 56.0 kg of butadiene was added thereto to carry out a reaction.

(6) After butadiene gas was completely consumed, while the internal temperature of the reaction system was maintained at 75°C, a solution obtained by dissolving 718 g of a coupling agent "ADEKASIZER O-130P™" (manufactured by ASAHI DENKA CO., LTD) made of epoxidized soybean oil in 5L of cyclohexane, was added thereto to carry out a coupling reaction for 10 minutes.

(7) All polymerization active terminals were deactivated by water.

(8) After a preliminary concentration of the polymerization solvent, an evaporation treatment was carried out by a vented extruder to obtain pellets.

The block copolymer mixture obtained in each of Experiments 1 and 2 was blended with a general-purpose polystyrene (manufactured by Toyo Styrene Co., Ltd.: G200C) at a weight ratio of the block copolymer mixture/general-purpose polystyrene of 6 to 4, followed by supplying to a 40 mm single screw extruder, and a molten strand was withdrawn from a die at 200°C, cooled with water and cut by a cutter to obtain resin pellet.

Further, molecular weight data in tables 2 to 5, and MFR, Haze, Total luminous transmittance, Total absorbed energy and Charpy impact strength in Table 6 were measured in the same manner as disclosed in the specification of the present application.

Table 1 Amount of materials changed

	Experiment 1	Experiment 2	Disclosed value in Table 19 of Moczygemba I	Disclosed value in Example 1 of the present invention
Solvent cyclohexane (g)	467 kg	467 kg	168.9 phm	3836 g
First stage catalyst solvent	850 ml	710 ml	0.032 phm	5.8 ml
First stage styrene	80.0 kg	69.0 kg	40 phm	568 g
Second stage catalyst solvent	910 ml	1700 ml	0.0034 phm	14 ml

Second stage styrene	40.0 kg	23.0 kg	20 phm	188 g
Third stage catalyst solvent	2670 ml	3560 ml	0.100 phm	29.3 g
Third stage styrene	20.0 kg	52.0 kg	10 phm	428 g
Fourth stage styrene	30.0 kg	-	15 phm	-
Butadiene	30.0 kg	56.0 kg	15 phm (0.5 phm is considered to be incorrect)	460 g
Epoxidized soybean oil	860 g	718 g	0.42 phm	5.9 g

Table 2 Analyzed values of polymer content formed by the end of fourth stage styrene polymerization

	Experiment 1	Experiment 2	Disclosed value in Example 1 of the present invention
Peak top molecule weight M1	151000	140000	143000
Peak top molecular weight M2	34400	17900	20000
Peak top molecular weight M3	9600	7400	8900
Molar ratio of component S1	16.1	9.6	9.8
Molar ratio of component S2	24.0	33.3	30.9
Molar ratio of component S3	59.9	57.1	59.3
M1/M3	15.73	18.92	16.07
M2/M3	3.58	2.42	2.25
Molecular weight distribution (Mw/Mn)	3.02	4.41	3.76

Table 3 Analyzed values of polymer content formed by the end of butadiene polymerization

	Experiment 1	Experiment 2	Disclosed value in Example 1 of the present invention
Peak top molecular weight M4	161000	155000	167000
Peak top molecular weight M5	46400	35300	41000
Peak tap molecular weight M6	22000	24100	29000
M4/M6	7.32	6.43	5.76
M5/M6	2.11	1.46	1.41
Number average molecular weight of polymer block	6800	10300	11000

comprising conjugated diene as monomer units			

Table 4 Analyzed values of block copolymer mixture containing a branched block copolymer

	Experiment 1	Experiment 2	Disclosed value in Example 1 of the present invention
Weight average molecular weight by GPC	144000	144000	137600
Number average molecular weight by GPC	87400	86800	82100
Molecular weight distribution by GPC	1.65	1.65	1.68
Peak top molecular weight of maximum peak by GPC	185000	202000	200000
Molecular weight distribution (Mw/Mn) of peak at which peak top molecular weight becomes minimum among peaks (a) at which the peak top molecular weight is from 20,000 to 50,000 and (b) which form a proportion of the area of from 3 to 15%	1.028	1.033	1.008
Proportion (%) of the area of peak at which the peak top molecular weight becomes maximum among peaks at which the peak top molecular weight is from 200,000 to 380,000	7.1	43.0	5.2

Table 5 Results of evaluation of physical properties of block copolymer mixture containing a branched block copolymer

	Experiment 1	Experiment 2	Disclosed value in Example 1 of the present invention
PBd amount (%)	15	28	28
MFR (g/10 min)	10.0	13.1	15.5
Total luminous transmittance (%)	90.4	89.2	89
Haze (%)	4.8	8.2	2.0

Table 6 Blend of block copolymer mixture containing a branched block copolymer and general-purpose polystyrene

	Experiment 1	Experiment 2
MFR (g/10 min)	8.4	9.1
Haze (%)	3.9	11.1
Total luminous transmittance (%)	89.2	74.6
Total absorbed energy (J)	0.05	0.15
Charpy impact strength (kJ/m)	1.4	1.3

As shown in Table 6, the total absorbed energy is 0.05 J in the experiment of

Moczygemba I, while the total absorbed energy is 0.015 J in the experiment of the present

specification. A poor impact resistant polymer of Moczygemba I is insufficient for an

application for extrusion molding for e.g. sheets or films.

With the process describe in the present specification, the claimed copolymer is

obtained in which the balance between the transparency and the impact resistance is

advantageous, and, therefore, the claimed block copolymer mixture is different from that of

Moczygemba I and has inventive step since the claimed copolymer mixture *cannot be readily*

made by the person skilled in the art based on the disclosure of Moczygemba I.

In addition, one would not have modified the copolymer of Moczygemba I to arrive at

the clamed block copolymer mixture because a goal of Moczygemba I is to balance impact

strength and ductility of an article prepared from the described block polymers (col. 1, lines

19-50), while the claimed copolymer provides an excellent balance of transparency and

impact resistance even in an injection molded product (see page 1 of the present

specification).

In addition, Moczygemba I generally describes that the butadiene content is 5-45

mass %, but specifically describes co-polymers having a different content of butadiene, i.e.,

5-25 mass % with the preferred range of 10-20 mass % and 13-17 mass %, 15 mass %, and 7

mass % (see Table 7 and Tables 14-17 and 21). Moczygemba I does not describe or suggest

selecting 25-35 mass % of butadiene in the copolymers. Comparative Examples of Table 23

comprise 25 mass % of butadiene which does not provide a copolymer with the satisfactory properties, i.e., haze, impact strengths (see col. 27, line 59 to col. 28, line 30 and Table 24). Thus, Moczygemba I *teaches away* from the claimed copolymers.

The Examiner is of the opinion that block polymers having the claimed molecular weight distribution/ratio would be inherently produced based on the data of Table 5 of Moczygemba I. However, Table 5 describes block polymers of embodiment 1 having tapered or random structure, the compatibility of which is inferior compared to the claimed block polymers. Because the claimed and the Moczygemba I copolymers are different, it is impossible to compare the molecular weight of polystyrene chains. Therefore, the claimed property is *not inherent* to the Moczygemba I block polymers having different structure and characteristics. Also, the experimental data provided above show that the Moczygemba I block polymers have different properties from that claimed.

Lastly, Moczygemba I does not teach that the block polymers mixture comprises 65-90% of the branched block polymers (see present claim 2) and the proportion of S1 to the total number of S1, S2, and S3 is from 2 to 30% (present claim 3).

Thus, Moczygemba I does not make the claimed block polymer obvious. Applicants request that the rejection be withdrawn.

Respectfully submitted,

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